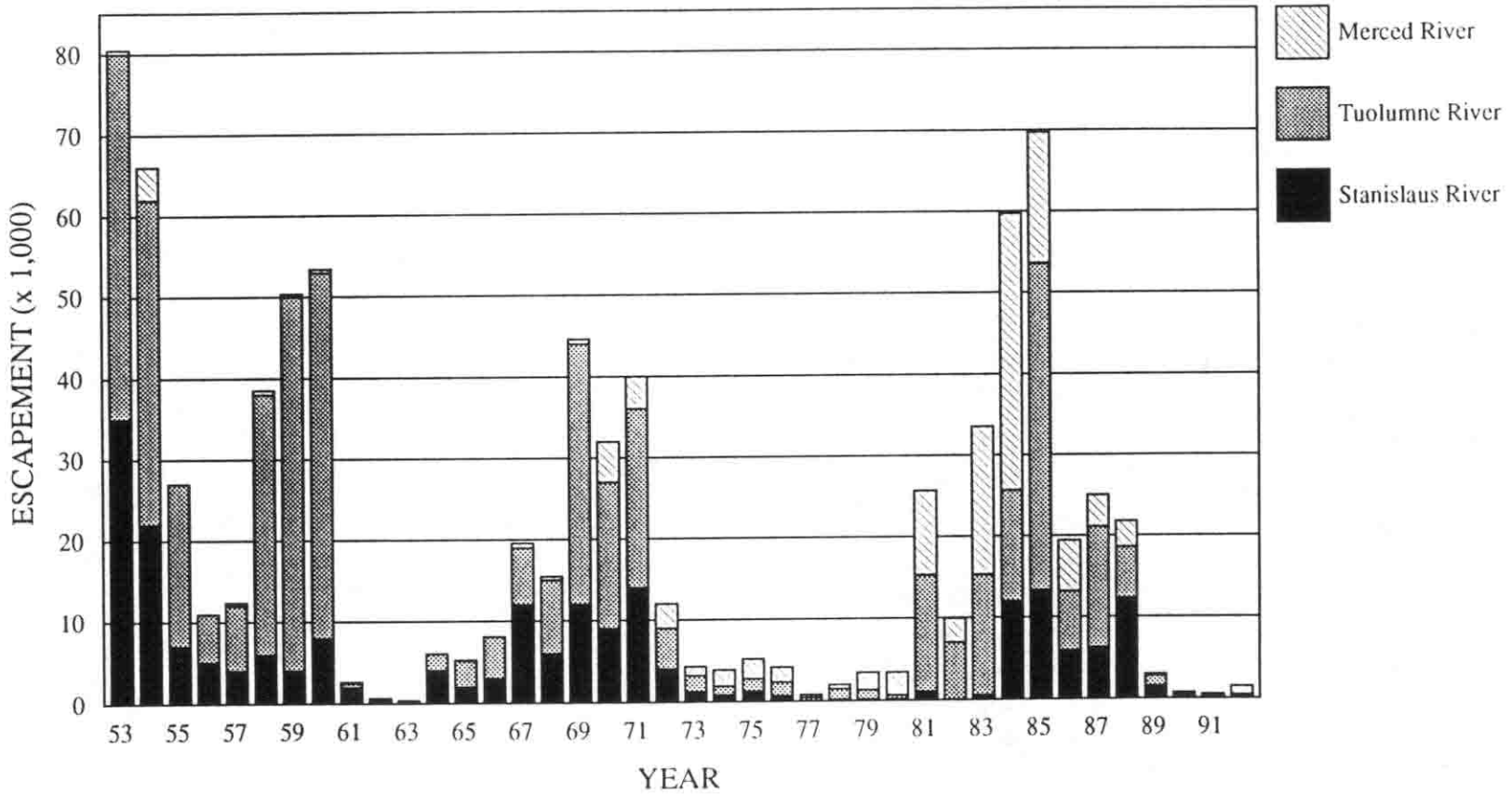
Fall-Run Chinook Salmon Spawning Escapement
San Joaquin Drainage



Source: Department of Fish and Game, Region 4
Note: 1991 and 1992 are preliminary estimates

Figure 2

inadequate instream flows, water developments, harvest, poor water quality, water diversions, habitat deterioration and other factors have had varying degrees of impact. The higher escapement years are strongly correlated with wet years and poor escapements correlate with normal, dry and critical water years.

Artificial propagation (hatchery production) of salmon in the San Joaquin drainage is limited to the capacities at Merced River Fish Facility (MRFF) and more recently the temporary use of the Tuolumne River Fish Facility (TRFF).

MRFF, near Snelling, was first operated in 1970 with a capacity of 250,000 yearling salmon. It was modernized in 1991 to allow incubation of up to four million salmon eggs and rearing of 600,000 smolts and 360,000 yearling salmon for release in the drainage. Production of yearlings is hampered by high summer water temperatures (>60°F) and associated disease problems.

TRFF is the temporary facility developed in an abandoned section of Modesto Irrigation District's upper main canal near La Grange. The maximum capacity of this facility is unknown. Approximately one million smolts were reared there in 1989 and small groups of yearling salmon were produced in 1991 and 1992. Use of this facility is considered temporary by the Department of Fish and Game due to the physical constraints of access and the deep configuration of the old canal.

The average contribution of hatchery smolts from MRFF to subsequent San Joaquin escapements has ranged from 0 to 30 percent. Generally, yearling contribution rates to San Joaquin escapements are nearly double the rates observed for smolts.

Production at MRFF peaked in 1986 with the release of approximately 1.21 million smolts and 0.37 million yearlings. TRFF began operation in 1989 and production peaked there that year with the release of approximately 1.00 million smolts. Since 1986 the production of fish at these facilities has fallen well below capacities as the current drought continued. The 1992 production at MRFF and TRFF combined was approximately 50,000 yearlings. Hatchery contributions to the escapements in the San Joaquin drainage have averaged less than 10 percent although in low escapement years hatchery fish contribution rates are much higher, particularly on the Merced River.

The current drought (1987-1992) has resulted in very poor escapements beginning in 1990 and probably extending for five or more years. In comparison to the 16 year drought beginning in the late 1930's, or the 1976-1977 drought, the last six years have been relatively unique due primarily to the consecutive years of extremely low runoff. Water demands and use has increased since then and continued low runoff was not anticipated

by the water managers, the consumptive users, or the fish management agencies.

It is anticipated that San Joaquin tributary spawning escapements will remain near the very low levels observed in 1990 and 1991 or dwindle even further if existing environmental conditions continue. In addition to the loss of public use, these consecutively low population levels can seriously jeopardize the genetic variability of this salmon stock. Genetic attributes that help this population adapt to changes in their environment may be lost forever if a catastrophe occurs. Spawning populations in the San Joaquin drainage have fallen below 1,000 fish three times since the early 1960's (1962, 1963 and 1977). These low escapements followed previous drought periods that extended for no more than three consecutive brood years.

Salmon runs are commonly comprised of a mixture of two, three, four, and a few five year old fish. The participation of individuals from diverse age groups in each reproductive cycle is an important strategy that helps insure the maintenance of genetic variability and diversity during short sequences of low spawning runs. Since the current drought began in 1987, we have observed only the first three (1989, 1990 and 1991) of at least six consecutive spawning runs which have been strongly impacted by below normal runoff and the existing level of water development. Salmon runs into the San Joaquin drainage totaled less than 1,000 salmon in 1990 and 1991 and may not recover appreciably for four or more years without significant assistance. The rare sequence of drought years in combination with the burden of baseline pressures on San Joaquin salmon make this stock particularly vulnerable through 1996.

E. Proposed Actions

The SJRMP Advisory Council believes it is prudent for private, State and Federal water and fishery managers and others to take action to improve spawning populations and increase the survival of the offspring originating in the San Joaquin drainage. The focus of this Plan is on actions that improve the health and survival during each discrete life stage of fall-run salmon, beginning with adult fish in 1992, during the next five years.

The order of these section and action items does not imply a priority ranking; however, priority should be given to those actions which would promote naturally spawned salmon. When both natural and artificial salmon production options are feasible the preference should be given to natural production. Hatchery and other artificial substitutes for habitat may be the only means to protect and increase salmon production in some situations; and

additional hatchery production is contemplated for the longer term restoration effort.

Improving the spawning escapements of the adult fish now in the ocean, as well as the survival of their young can speed the recovery of salmon populations in the San Joaquin drainage. Recalling there are four weak year classes now in the ocean (1988, 1989, 1990 and 1991), actions that improve survival of their offspring can help build the spawning populations more quickly and help avoid further attenuation of low production levels. We have chosen to list the actions following the normal sequence of life history stages (adults, eggs, alevins, fry, etc.).

Several of these actions may be grouped into a "suite" of actions to further magnify the improvements in survival and adult production. Although this Action Plan deals with improvements in the salmon population throughout the San Joaquin drainage, it is important that each tributary must be dealt with as an individual influence to the overall plan. Subsequent efforts should include sub plans for each tributary. The objectives of these actions are (1) to obtain measurable increases in adult spawning escapements, (2) to increase the number offspring surviving the annual migration to the Pacific Ocean, and (3) to protect the stock from catastrophic loss. The responsible agencies and parties should be consulted on the priority, the groupings, and the relative merits of the proposed actions.

1. **Adult salmon in ocean and inland waters** Maintenance of good habitat and healthy salmon populations that support sport, commercial and other uses is a long term goal. In the San Joaquin drainage it appears most important to increase the number of offspring produced from the next five generations (1992, 1993, 1994, 1995 and 1996). Legal and illegal harvest removes a significant number of adult male and female salmon from the population prior to spawning. The following measures have potential to increase the number of age three, four or five adult salmon that survive to successfully spawn in the San Joaquin tributaries:

   a. Evaluate the costs, benefits and practicality of a marking program for hatchery origin salmon with an identifiable external mark to provide greater protection of naturally produced salmon and selective harvest of hatchery fish by sport and commercial anglers. The mortality rate of sub-legal fish caught and released in the ocean fisheries is thought to range from 12 to 30 percent. Definitive information does not exist. This mortality factor can strongly influence the net benefit of a complete marking program for hatchery stocks. Therefore, it is